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NOTES, ABSTRACTS, AND REVIEWS

AIR TEMPERATURE AND THE INTENSITY OF RADIO SIGNALS

As a part of the research program of the International Union of Scientific Radio Telegraphy, the Radio Physical Laboratory, Bureau of Standards, Washington, has been carrying out field intensity measurements on the Radio Corporation stations located at New Brunswick, N. J., and Tuckerton, N. J. The following extracts from a communication by Mr. L. W. Austin, in charge of this work, on behalf of the International Union, brings out clearly a relation between air temperature and the intensity of radio signals.

Measurements on stations at moderate distances were first taken up with the intention of using their signals as standards for the calibration of the telephone comparator employed in the measurement of European stations. During the preliminary experiments satisfactory constancy was obtained in the signals from WQK (Rocky Point), L. I., but as warm weather came on, irregularities appeared and the observations were shifted to WII (New Brunswick, N. J.) since it is nearer and for this reason perhaps less likely to show variations. Observations were taken twice a day at about 10 a. m. and 3 p. m. on a low antenna swung about three meters from the ground between the towers of the main antenna. The radiation height (effective height) is 1.2 meters. The mean of the morning observations for the year, omitting the disturbed days in January, February, and March, gives a field intensity for New Brunswick of 3.06 millivolts per meter. As 10 per cent is, under ordinary circumstances, the limit of accuracy of these measurements, observations which lie within this limit are considered normal.

In June, 1923, the morning signals from WII, which are more regular than those of the afternoon in summer, on account of the absence of the afternoon absorption, fell below normal on 10 days, on 3 of which the deviation lay between 30 per cent and 50 per cent. In July, the morning signals were abnormal on 7 days, twice being more than 30 per cent low, while on July 17 they rose for an hour or two to 85 per cent above normal without apparent cause.

From August 1 to December 30, 1923 the signals were more regular. During August they varied in the morning less than 10 per cent except for slight variations on three days. In September they were also below normal on 3 days, one day being 40 per cent low. In October they again exceeded the 10 per cent variation slightly on 3 days. In November the three variations were all high, the greatest deviation being 24 per cent. In December there was one low variation of 21 per cent and one high, 63 per cent.

Regular observations were begun on WGG, Tuckerton, in October, 1923. This station averages about 12 per cent below WII in intensity, giving 2.7 millivolts per meter. Table 1 shows the monthly averages of the New Brunswick (WII) and of the Tuckerton (WGG) observations for both morning and afternoon, and figure 1 shows the morning values in graphic form.

TABLE 1.—Monthly average signal intensities (millivolts per meter) of stations WII and WGG, at 10 a. m. and 3 p. m., June, 1923, to May, 1924, measured at Bureau of Standards

Month	New Brunswick (WII)		Tuckerton (WGG)	
	10 a. m.	3 p. m.	10 a. m.	3 p. m.
June.....	2.86	2.53
July.....	2.94	2.62
August.....	2.91	2.60
September.....	2.91	2.96
October.....	2.94	2.84	2.60	2.56
November.....	3.26	3.13	2.72	2.60
December.....	3.18	3.00	2.77	2.79
January.....	4.52	4.02	3.88	3.88
February.....	4.94	5.19	3.82	4.58
March.....	3.56	3.51	2.81	2.84
April.....	2.95	3.11	2.73	2.91
May.....	2.60	2.65	2.40	2.65

During December 1923, there was no very cold weather in Washington, but with the cold waves of January, 1924, there was a marked increase in the irregularities of WII and WGG and in a lesser degree of WQK. This last station was only observed occasionally. At the time of the passage of each of the cold waves

there was an increase in signal strength especially during the severe cold toward the end of the month. In order to show this more clearly the maximum signal of WII or WGG at the two observation times and the reciprocal of the temperature are plotted in Figure 2. The observations on the signals and the 8 o'clock a. m. temperatures at the Bureau of Standards are given in Table 2.

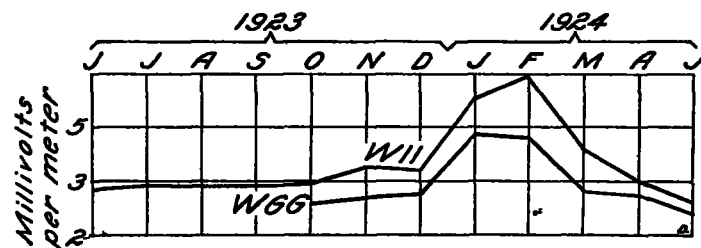


FIG. 1.—New Brunswick (WII) and Tuckerton (WGG) monthly average (a. m.) signal intensities at Bureau of Standards

TABLE 2.—Signal intensities (millivolts per meter) of stations WGG and WII, and air temperature, measured at Bureau of Standards, January, 1924. Maximum intensities in italics

Date	Tuckerton (WGG)		New Brunswick (WII)		Temperature (8 a. m.) at Bureau of Standards ° F.
	10 a. m.	3 p. m.	10 a. m.	3 p. m.	
1					29
2	3.45	2.56	2.66	2.33	36
3	2.70	2.56	5.06	2.66	27
4				3.13	31
5	2.63			3.28	
6					19
7			5.00	3.13	22
8	5.66	3.16		3.06	33
9			5.26		37
10			5.13	3.13	63
11	3.16			3.19	35
12		2.96	5.26		26
13				3.06	21
14		5.80	3.66		40
15	2.96	5.66			41
16		2.96	5.13	3.33	35
17		3.73	4.66	5.00	33
18		4.93	5.66	6.00	10
19	3.93	2.96	5.32		8
20				6.65	29
21	2.76	3.93		4.33	30
22	5.56		6.00	5.00	35
23	2.96	2.96	5.26	5.00	12
24	4.60	4.93	6.00		20
25	4.26	4.93	5.00		34
26	4.93	4.26	5.66	5.00	42
27			6.65+		33
28	4.93		6.65+	4.66	
29	2.96	4.60	5.32	6.00	
30	3.60	4.93	3.26	5.33	
31	4.66	3.94		4.66	

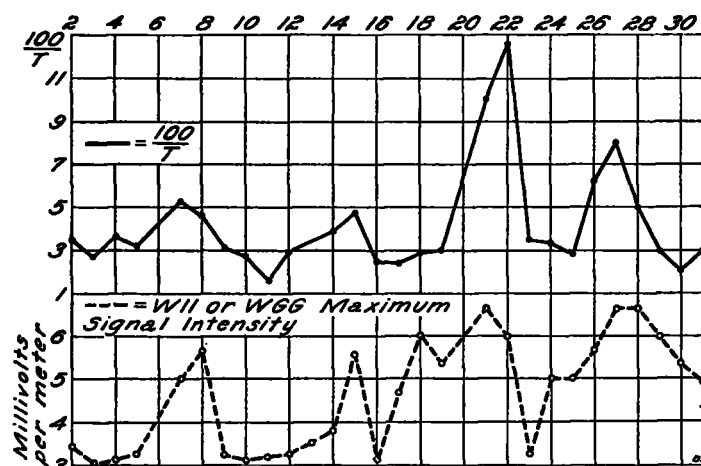


FIG. 2.—Signal intensity and temperature, January, 1924. The maximum intensity and the reciprocal of the temperature are shown

During the moderate cold of January 7 and 15, 1924, sometimes only one of the two stations seemed to be affected and the high readings were observed for only a part of the time, but during the extreme cold of January 22 and 27 both of the stations regularly observed as well as WQK and WSO (Marion, Mass.) remained high throughout the day, and in the last case for several days. There were also at these times marked shifts in the apparent directions of the stations even in the forenoon when their bearings are usually correct. NSS (Annapolis) 53 kilometers away, showed no increase in signal strength during these times. The end of the cold weather of January did not at once restore receiving conditions to the uniformity of the autumn and early winter but left an instability which persisted through the comparatively mild cold of February and a portion of March. During this time the signals from WII and WGG fluctuated frequently, going to more than twice their normal strength for a few hours and then returning to normal without any obvious relation to weather conditions.

Since March 19 these large irregularities have ceased and transmission seems to have returned to a stable condition with nearly the same average signal strength as in the autumn. The observations which have been taken on Annapolis and on the Radio Corporation stations at various distances indicate that large variations in intensity do not generally occur at 50 kilometers, that they are large at distances of 250 to 300 kilometers and again become less at 400 to 700 kilometers.

The few night observations which have been taken show somewhat higher and less regular values than those taken during the day.

It is too early to give any definite explanation of the variations observed. Their cause is evidently atmospheric and the connection with the cold waves of January suggests either that the part of the atmosphere concerned in the variations lies much below the Heaviside surface (80 or 100 km.) or that weather phenomena are in some way correlated with atmospheric action at much greater heights than has been hitherto supposed.

SERIOUS DROUGHT IN SOUTHERN HEMISPHERE

Information from various sources indicates the existence of a serious drought in various portions of the Southern Hemisphere.

In a recent communication from Señor Julio Buston Navarete of the El Salto Observatory of Santiago, Chili, he remarks as follows:

The present year (1924) has been extraordinarily dry in all parts of the Southern Hemisphere. Observations received from Australia, from all of America, and from South Africa indicate a deficiency of rain in all of these regions.

In Chili the rainfall of 1924 was the least in 100 years according to the journal *El Diario Ilustrado*, Santiago, Chili, November 13, 1924.

Attempt has been made to discover the extent and precise location of this drought through the literature which is received in the Weather Bureau library. The result is that no information is available for Australia, except for Brisbane, only. For this place seven out of the nine months available for 1924 show a rain deficit of 11.42 inches; as an offset against this amount two months had an excess of 5.99 inches. The total deficit is therefore about 6 inches.

For Rhodesia, South Africa, the rainfall of the period, October, 1923–April, 1924, was but 60 per cent of normal—a severe drought.

For South America, in addition to Chili, as above, returns from Brazil indicate that the winter months of July and August, and the months of September and October were rather markedly deficient in rainfall. For Argentina, the returns bring the rainfall up to August, 1924, only. These, as in Brazil, show a deficit for the winter months rather more general than in Brazil, although not so pronounced as in Chili.

For the United States and Canada, the chart, page 589, shows the abnormalities of rainfall for 1924.—A. J. H.

JAMAICA RAINFALL IN 1923

The editor is in receipt of publication No. 564, Rainfall Statistics for Jamaica, 1923.

In common with other parts of the West Indian-Caribbean region and the northern coast of South America, the rainfall of 1923 in Jamaica was deficient by amounts ranging from 20 to 25 per cent of the 50-year normal. The year 1923 marks the third consecutive year with deficient rainfall centering in the West Indies.

The monthly and annual amounts for approximately 425 stations in this region are given in the publication *Climatological Data, West Indies and Caribbean Service*, issued at San Juan, P. R., Dr. O. L. Fassig, in charge.

RAINMAKER FAILS

Under the caption, "Rainmaker fails. Hatfield folds tower, silently leaves valley," the Fresno Bee, Fresno, Calif., in its issue of December 21, 1924, published the following:

BAKERSFIELD (KERN Co.), December 20.—Charles M. Hatfield, "rainmaker," is silently making preparations to leave La Panza Plains, this county, after failing by 0.6025 inches to fulfill his contract for producing 1½ inches of rain between November 20 and December 20. The effort was unsuccessfully terminated at midnight last night, according to Frank G. Munzer, timekeeper for the stockmen who put up the \$4,000 which was to have been paid the "wizard." Official gauges at Maricops [Maricopa?], the Olcese ranch, Bakersfield, and Delano, registered 0.8975 inches, Munzer said.

OPEN WINTER IN BAFFIN BAY

In a recent letter to Rear Admiral Billard, commandant, Coast Guard, dated Detroit, Mich., Donald MacMillan, well-known Arctic explorer, makes the following interesting comments:

In my 16 years of Arctic work I have never seen Baffin Bay so clear of ice as last season (1924).

I attribute this to very strong, constant northerly winds throughout all last winter and spring and, consequently, expected a clear run home from latitude 78° 31' N., which we had. We have had now two very good seasons in the far north, all waters being remarkably free of heavy ice.

Readers of the REVIEW will be interested to know that Mr. MacMillan plans to return to the Arctic region next summer.